Translation

PCT/EP2003/013152

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 25286 WO	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/EP2003/013152	International filing date (*day/month/year*) 22 November 2003 (22.11.2003)	Priority date (*day/month/year*) 29 November 2002 (29.11.2002)
International Patent Classification (IPC) or national classification and IPC G01B 11/24		
Applicant OBE OHNMACHT & BAUMGÄRTNER GMBH & CO. KG		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 3 sheets, as follows:

      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I Basis of the report

   ☐ Box No. II Priority

   ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV Lack of unity of invention

   ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI Certain documents cited

   ☐ Box No. VII Certain defects in the international application

   ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16 April 2004 (16.04.2004)	13 August 2004 (13.08.2004)
Name and mailing address of the IPEA/EP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2003/013152

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language _____, which is language of a translation furnished for the purpose of:

☐ international search (under Rules 12.3 and 23.1(b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ The international application as originally filed/furnished

☒ the description:

pages 1-3, 5-22, as originally filed/furnished

pages* 4, 4a received by this Authority on 21 July 2004 (21.07.2004)

pages* _____ received by this Authority on _____

☒ the claims:

pages 2-11, 13-16, as originally filed/furnished

pages* _____, as amended (together with any statement) under Article 19

pages* 1,12 received by this Authority on 21 July 2004 (21.07.2004)

pages* _____ received by this Authority on _____

☒ the drawings:

pages 1/3-3/3, as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing *(specify)*: _____

☐ any table(s) related to sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

V. **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-11	YES
	Claims	12-16	NO
Inventive step (IS)	Claims		YES
	Claims		NO
Industrial applicability (IA)	Claims	1-16	YES
	Claims		NO

2. Citations and explanations

Reference is made to the following documents:

D1: US-A-4 912 336

D2: LEE M-R: '3D SHAPE RECONSTRUCTION.' INTERNATIONAL JOURNAL OF PATTERN RECOGNITION AND ARTIFICIAL INTELLIGENCE, WORLD SCIENTIFIC PUBLISHING COMPANY, SINGAPORE, SI, Vol. 15, No. 4, June 2001 (2001-06), pages 723-734, XP001110311 ISSN: 0218-0014

D3: PATENT ABSTRACTS OF JAPAN, Vol. 2000, No. 07, 29 September 2000 (2000-09-29) & JP 2000 097641 A (NIRECO CORP) 7 April 2000

D4: EP-A-0 046 241

D5: EP-A-0 047 936

1. Technical field: optical shape measurement and assessment of surfaces.

2. Prior art

D1 is considered the prior art most relevant to **independent claim 1**. In D1, a scattering and mirroring reflecting surface is inspected or

assessed, wherein successive light sources are switched on which each illuminate portions of surfaces of an approximately semispherical diffuser. Meanwhile, a camera records an image. The method is a photometric stereo method and the shining surface produces a "deflectometric method". When a light source is in operation, only a certain area is illuminated, so as to produce a planar coding of the locations on the diffuser surface. Furthermore, as a result of the semispherical shape of the diffuser, each location on the diffuser surface is clearly assigned a normal vector. With respect to **independent claim 12**, D2-D5 can equally be considered alongside D1 the most relevant prior art. D2-D5 are discussed in detail in point 3.2.

3. Novelty (PCT Article 33(2))

3.1 The subject matter of **independent claim 1** differs from the method of D1 in that each normal vector is clearly associated with a backscattered luminance on the diffuser and the backscattered luminances are associated with the illuminating levels of recorded images. The subject matter of claim 1 is therefore novel.

3.2 The subject matter of **independent claim 12** is not novel:

The wording of independent claim 12 implies that the device is merely suitable for carrying out the method according to claim 1. The wording therefore does not give any definition of the technical features of the device. In addition, the wording "with in particular a camera" implies that the

camera is only optionally present. Consequently, claim 12 defines unambiguously only that the device contains a plurality of light sources, an optical recorder, and a diffuser.

Such devices are not only known from **D1** (see in said document figures 1, 3 and column 3, line 23 to column 9, line 55 and the comments made in point 2), but also, for example, from **D2 to D5**:

The device in **D2** (figure 3; abstract; paragraph 2.2) measures the shape of surfaces using a light source, a scatter plate, and a camera. In **D3**, a light source 9 with an integrated diffuser (implicit) and a camera 7 are used to measure the geometry of holes. Finally, in **D4** (figures 1, 3; page 5, line 19 - page 7, line 11) and **D5** (figure 1; page 5, line 33 - page 6, line 10) the shape of glass containers is tested for damage using LEDs or flash lamps as well as diffusers and cameras.

3.3 The subject matter of **claims 13 to 16** is not novel either:

Claims 13: D1 uses a spherical diffuser 16. D2, D4 and D5 use rotation-symmetrical diffusers.

Claim 14: D3 uses a microscope 6.

Claims 15 and 16: D4 (page 5, line 29) and D5 (page 6, lines 6-10) use LEDs or flash lamps as a light source.

4. Inventive step (PCT Article 33(3))

The specific type of coding defined in **independent claim 1** enables the measuring technique to be simplified. The available prior art contains no suggestion in this direction which would lead to the same solution. D1 is restricted to the suggestion of switching on a plurality of light sources one after the other, and D2 to D5 are relevant merely to the device according to claims 12 to 16. The subject matter of independent claim 1 therefore involves an inventive step.

5. Dependent claims

Dependent claims 2 to 11 merely add further features to the subject matter of independent claim 1. The subject matter of claims 2 to 11 is therefore likewise novel and inventive.

6. Industrial applicability (PCT Article 33(4))

The subject matter of claims 1 to 16 is industrially applicable, for example, in the optical inspection of workpieces during their manufacture.